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10/672,195	09/26/2003	Alexey Martemyanov	79263	8942

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EXAMINER	
VO, TUNG T	
ART UNIT	**PAPER NUMBER**
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SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/14/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)
	10/672,195	MARTEMYANOV ET AL.
	Examiner	Art Unit
	Tung Vo	2621

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-37* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-25,28,29,31 and 33-37* is/are rejected.

7)☒ Claim(s) *26,27 and 32* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *26 September 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *01/02/04; 05/10/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 13, 15, 17, 20-23, and 28 are rejected under 35 U.S.C. 102(b) as being anticipated by Maeda et al. (US 6,965,643).

Re claim 13, Maeda discloses a method of real-time encoding a digitized sequence of video frames using codec with high compression efficiency (fig. 6), comprising steps of: dividing a video frame into macroblocks of pixels (124 of fig. 6, Note DCT divides a picture into macroblocks); performing texture prediction (129 of fig. 6) using reconstructed texture of previously encoded/decoded video data (128 of fig. 6); performing a texture prediction error transform (123 and 124 of fig. 6); and performing quantization and encoding of DCT transform coefficients (124 and 125 of fig. 6).

Re claim 15, Maeda further discloses a step of controlling parameters of encoded frames (136 of fig. 6).

Re claim 17, Maeda further discloses a step of selecting best parameters (136 of fig. 6) and encoding mode (132 of fig. 6) for macroblock coding based on preset coding parameters and codec working parameters.

Re claims 20 and 28, Maeda further discloses wherein the encoding mode is motion compensation (129 of fig. 6).

Re claim 21, Maeda further discloses wherein frame encoding starts with choosing a best prediction mode (Inter or intra prediction mode is performed in motion compensation, 129 of fig. 6).

Re claim 22, Maeda further discloses wherein the prediction mode is inter prediction mode predicting block pixels using reconstructed texture of previously coded/decoded frames and specifying block motion vectors (Note the motion compensation unit (129 of fig. 6) calculates a motion vector from data provided by frame memory (122 of fig. 6) and the reference frame memory (128 of fig. 6) see also 132 of fig. 6, setting inter or intra mode).

Re claim 23, Maeda further discloses wherein the prediction mode is intra prediction mode predicting block pixels using reconstructed texture of previously coded/decoded blocks of current frame and specifying prediction method (132 of fig. 6).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 16, 31, 33, 34, and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maeda et al. (US 6,965,643) in view of Takahashi et al. (US 6,683,992).

Re claims 16, 31, 33, 34, and 36, Maeda further teaches a step of controlling frame encoding time and CPU load (106 of fig. 4, Note timer for setting time (fig. 1) for encoding and CPU load (fig. 22 and 23); encoding of motion vector prediction difference (130 of fig. 6); wherein encoding of DCT transform coefficients is performed by coding based on two-dimensional contest/position-depending modeling (125 of fig. 6); decoding encoded texture, decoding coded block pattern of macroblock mode and texture using context-based modeling, decoding texture prediction error using context-based modeling, calculating prediction for motion vectors, and decoding motion vectors using context-based modeling, and wherein the texture prediction error is provided by inverse transform and dequantization correlated with corresponding encoding procedures (fig. 8, Note decoding).

It is noted that Maeda does not particularly disclose arithmetic encoding/decoding as claimed.

However, Maeda suggests that any coding system performs motion compensation can be implemented (col. 22, lines 32-33), so this is evidence to one of ordinary skill in the art to modify any encoding/decoding system to Maeda.

Takahashi teaches memory (16a of fig. 8), memory controller (15a of fig. 8), and processor (11a of fig. 8) for loading video frame to arithmetic coding engine (12a of fig. 8) and arithmetic decoding engine (14a) for performing arithmetically high-speed MPEG-4 compressive encoding on digital image data.

Therefore, taking the teachings of Maeda and Takahashi as a whole, it would have been obvious to one of ordinary skill in the art to incorporate the teachings of Takahashi into the method of Maeda in order performing high-speed encoding/decoding image data. Doing so would allow the cost of the hardware circuits performing the encoding/decoding process is minimized as suggested by Takahashi (col. 16, lines 45-col.17, line 5).

5. Claims 14 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maeda et al. (US 6,965,643) in view of Lee et al. (US 6,81,554).

Re claims 14 and 35, Maeda does not particularly teach a step of downscaling before encoding of the video frame using bilinear interpolation; and internal bilinear upscaling correlated with bilinear downscaling provided at the time of encoding as claimed.

However, Lee teaches a step of downscaling (220 of fig. 2; Downsampling) before encoding of the video frame using bilinear interpolation (fig. 3); and internal bilinear upscaling (230 of fig. 2, Upsampling) correlated with bilinear downscaling provided at the time of encoding. Lee further suggests various modifications and alterations to the described embodiments will be apparent to those skilled in the art in view of the teachings herein (col. 12,lines 44-49).

Therefore, taking the teachings of Maeda and Lee as a whole, it would have been obvious to one of ordinary skill in the art to incorporate the teachings of Lee into the method of Maeda for providing capability to any video compression process requiring the minimization of distortion under buffer constraints. Doing so would reduce buffer occupancy.

6. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Maeda et al. (US 6,965,643) as applied to claim 13 and 17, and further in view of Forchheimer et al. (US 6,594,395).

Re claim 19, Maeda does not particularly teach wherein the encoding mode is a low-complexity 3- dimensional data coding as claimed.

However, Forchheimer teaches teach wherein the encoding mode is a low-complexity 3-dimensional data coding (col. 2, lines 45-47; 3-D coding data, col. 6, lines 12-53).

Therefore, taking the teachings of Maeda and Forchheimer as a whole, it would have been obvious to one of ordinary skill in the art to incorporate the teachings of Forchheimer into the method of Madea in order to performing high compression efficiency to achieve video communication with low power terminals.

7. Claims 24 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maeda et al. (US 6,965,643) in view of Maeda (US 6,909,810).

Re claims 24 and 25, Maeda'643 does not particularly teach wavelet transform, wherein resulting wavelet transform coefficients are compressed by context-based entropy coding wherein uniform quantization with constant stepsize is applied to all wavelet transform coefficients as claimed.

However, Maeda'810 teaches wavelet transform coefficients are compressed by context-based entropy coding wherein uniform quantization with constant stepsize is applied to all wavelet transform coefficients (9 and 11 of fig. 4, Note quantizer (11 of fig. 4) for quantizing the wavelet transform coefficients with constant stepszie).

Therefore, taking the teaching of both Maeda references as a whole, it would have been obvious to one of ordinary skill in the art to incorporate the teachings of Maeda'810 into the method Maeda'643 for same purpose of entropy encoding the texture, so that the coding efficiency can be improved by reducing the number of bit planes.

8. Claims 18, 29, and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maeda et al. (US 6,965,643) as applied to claim 13, 17, 20, and 28, and further in view of Srinivasan (US 7,110,459).

Re claims 18, 29, and 37, Maeda does not particularly teach step of deblocking of decoded video frame using at least one of horizontal and vertical deblocking passes for smoothing of sequence of video frame border points; step of noise suppression; and wherein the motion vectors are calculated with quarter-pel accuracy as claimed.

However, Srinivasan teaches step of deblocking of decoded video frame using at least one of horizontal and vertical deblocking passes for smoothing of sequence of video frame border points and noise suppression (col. 10, lines 9-11), and the motion vectors are calculated with quarter-pel accuracy (col. 12, lines 14-21).

Therefore, taking the teachings of Maeda and Srinivasan as a whole, it would have been obvious to one of ordinary skill in the art to incorporate the teachings of Srinivasan into the method of Maeda to provide a video encoder and decoder use one or more approximate bicubic filters when computing pixel values at sub-pixel positions in reference video frames. This improves the effectiveness of motion prediction using the computed pixel values.

9. Claims 1, 2, 7-8, 10, and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maeda et al. (US 6,965,643) in view of Takahashi et al. (US 6,683,992).

Re claims 1-2, 7-8, 10, and 12, Maeda teaches a video codec for encoding/decoding (figs. 3-8, 22 and 23) digitized sequence of video frames with high compression efficiency (1001 of fig. 3), comprising:

means for frame encoding (1001 of fig. 3) ;

means (132 of fig. 4, 500 of fig. 22) for setting codec parameters and storing codec setting parameters (501 of fig 22; Note the encoder is implemented in the CPU, the CPU would obviously use for setting and storing codec parameters);

means (105 and 106 of fig. 4) for controlling desired frame encoding time (TIMER, 106 of fig. 4) and CPU loading 500 of fig. 22, Note CPU would obviously load the frame to encoder (1001 of fig. 3));

means (136 of fig. 6) for rate control including size of frame encoding output bitstream (135 of fig. 6, Note output bitstream);

means for storing reference frames (128 of fig. 6);

means for motion compensation (129 of fig. 6) to perform motion estimation, frame head coding, macroblock encoding and coded frame reconstruction and storage.

means for macroblock encoding (125 of fig. 6), comprising:

means for intra prediction, at least one means for inter prediction (129 of fig. 6),

means (132 of fig. 6) for selecting macroblock type and encoding setting,

means (123 of fig. 6) for calculating macroblock texture prediction and prediction error,

means (124 of fig. 6) for performing texture prediction error transform and transform coefficient quantization;

means (129 of fig. 6) calculating motion vector prediction and prediction error; and

means (130 and 133 of fig. 6) for entropy encoding providing context encoding of motion vectors, header parameters and transform coefficients;

wherein the decoding means (fig. 8) comprises means (206 of fig. 8) for motion vector reconstruction, transform coefficient inverse quantization (208 of fig. 8), texture prediction inverse transform (211 of fig. 8), and reconstructed macroblock texture unit (207 of fig. 8).

It is noted that Waeda does not particularly teach means for arithmetic coding of quantized transform coefficients; decoding means performing arithmetic context-based decoding using decoding modeling corresponding to arithmetic encoding of the codec as claimed.

However, Takahashi means (12a of fig. 8; fig. 11) for arithmetic coding of quantized transform coefficients (1103 and 1104 of fig. 11); decoding means (14a of fig. 89) performing arithmetic context-based decoding using decoding modeling corresponding to arithmetic encoding of the codec (90 of fig. 10, Note shape is model).

Therefore, taking the teachings of Maeda and Takahashi as a whole, it would have been obvious to one of ordinary skill in the art to incorporate the teachings of Takahashi into the method of Maeda in order performing high-speed encoding/decoding image data. Doing so would allow the cost of the hardware circuits performing the encoding/decoding process is minimized as suggested by Takahashi (col. 16, lines 45-col.17, line 5).

10. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Maeda et al. (US 6,965,643) in view of Takahashi et al. (US 6,683,992) as applied to claim 1, and further in view of Lee et al. (US 6,81,554).

Re claim 3, Maeda does not particularly teach mean for downscaling before encoding of the video frame using bilinear interpolation and upscaling correlated with bilinear downscaling provided at the time of encoding as claimed.

However, Lee teaches means for downscaling (220 of fig. 2; Downsampling) before encoding of the video frame using bilinear interpolation (fig. 3); and bilinear upscaling (230 of fig. 2, Upsampling) correlated with bilinear downscaling provided at the time of encoding. Lee further suggests various modifications and alterations to the described embodiments will be apparent to those skilled in the art in view of the teachings herein (col. 12,lines 44-49).

Therefore, taking the teachings of Maeda, Takahashi, and Lee as a whole, it would have been obvious to one of ordinary skill in the art to incorporate the teachings of Lee into the combined video codec of Maeda and Takahashi for providing capability to any video compression process requiring the minimization of distortion under buffer constraints that would reduce buffer occupancy.

11. Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maeda et al. (US 6,965,643) in view of Takahashi et al. (US 6,683,992) as applied to claim 1, and further in view of Srinivasan (US 7,110,459)..

Re claims 4 and 5, Maeda does not particularly teach deblocking means for processing reconstructed frame texture to eliminate blocking effect restored data encoded at high distortion and noise suppression as claimed.

However, Srinivasan teaches deblocking means for processing reconstructed frame texture to eliminate blocking effect restored data encoded at high distortion and noise suppression (col. 10, lines 9-11).

Therefore, taking the teachings of Maeda, Takahashi, and Srinivasan as a whole, it would have been obvious to one of ordinary skill in the art to incorporate the teachings of Srinivasan into the combined video codec of Maeda and Takahashi to provide a video encoder and decoder use one or more approximate bicubic filters when computing pixel values at sub-pixel positions in reference video frames. This improves the effectiveness of motion prediction using the computed pixel values.

12. Claims 6, 9, and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Maeda et al. (US 6,965,643) in view of Takahashi et al. (US 6,683,992) as applied to claims 1 and 10, and further in view of Forchheimer et al. (US 6,594,395).

Re claims 6, 9, and 11, Maeda does not particularly three-dimensional (3-D) frame encoding/decoding; means for selecting a codec mode between motion compensation and 3-D encoding/decoding, depending on desired reconstructed sequence quality and bitrate parameters; means for 3-D inverse transform and dequantization as claimed.

However, Forchheimer teaches three-dimensional (3-D) frame encoding/decoding (col. 2, lines 45-47; 3-D coding data, col. 6, lines 12-53); means for selecting a codec mode between

motion compensation and 3-D encoding/decoding (col. 6, lines 12-53), depending on desired reconstructed sequence quality and bitrate parameters; means for 3-D inverse transform and dequantization (SPTIAL DECODER of fig. 4, where IDCT and DQ are obviously implemented in the decoder (see fig. 8 of Maeda))

Therefore, taking the teachings of Maeda, Takahashi, and Forchheimer as a whole, it would have been obvious to one of ordinary skill in the art to incorporate the teachings of Forchheimer into the combined video codec of Madea and Takahashi in order to performing high compression efficiency to achieve video communication with low power terminals.

Allowable Subject Matter

13. Claims 26-27, and 32 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Horiike et al. (US 6,044,114) discloses a method and apparatus for coding and decoding digital image data using image quantization.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tung Vo whose telephone number is 571-272-7340. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mehrdad Dastouri can be reached on 571-272-7418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Tung Vo
Primary Examiner
Art Unit 2621